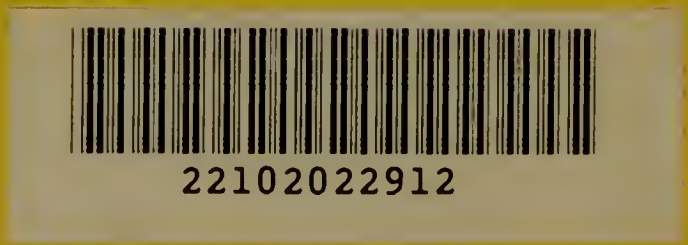

ANTIQUITY OF MAN

AS DEDUCED FROM THE

DISCOVERY OF A HUMAN SKELETON

DURING THE

EXCAVATIONS OF THE EAST AND WEST INDIA DOCK-EXTENSIONS

AT

TILBURY, NORTH BANK OF THE THAMES.

BY

SIR RICHARD OWEN, K.C.B., F.R.S., ETC.,

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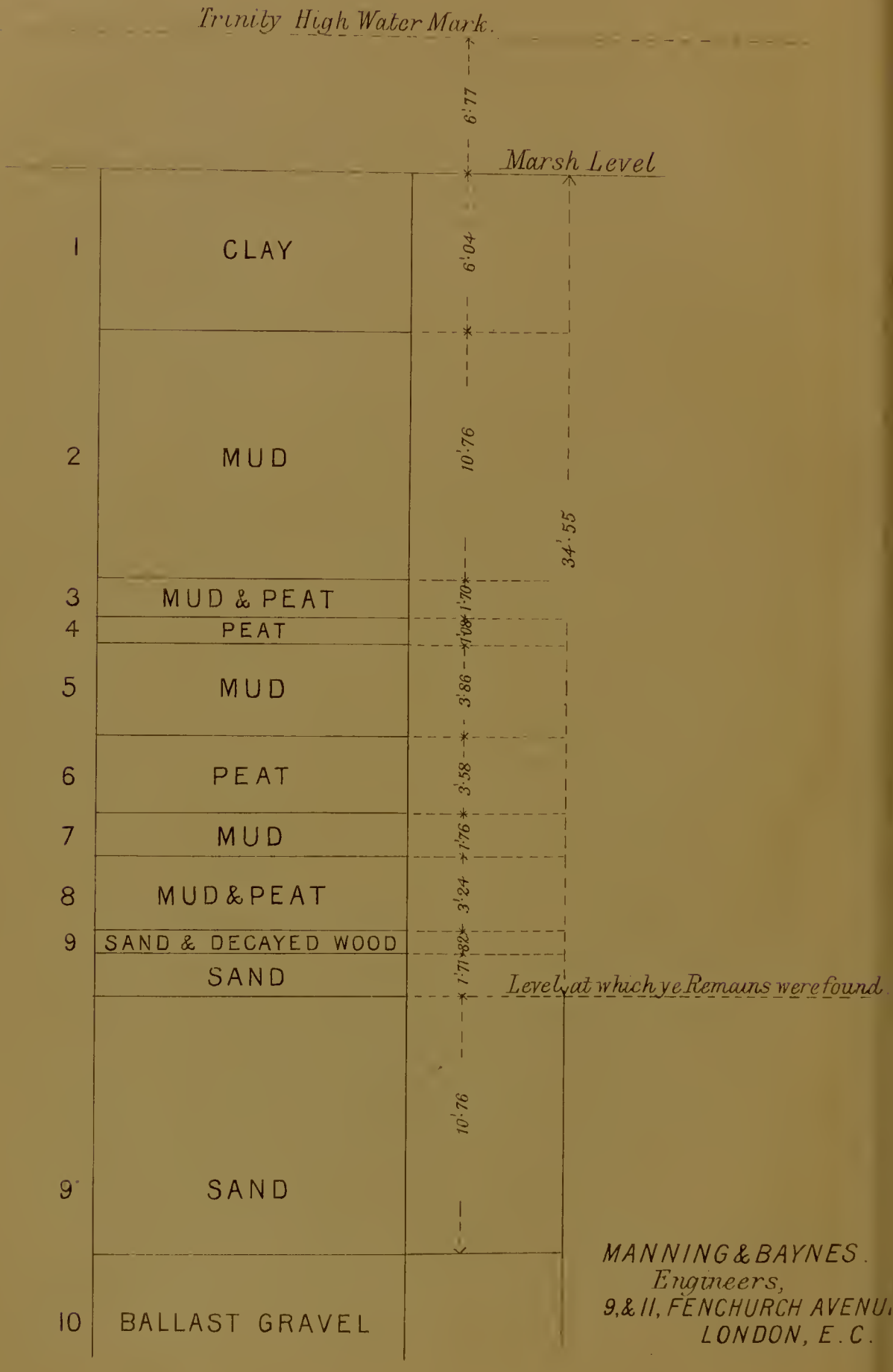
(to face p. 3)

SECTION OF STRATA OVERLYING A HUMAN SKELETON.



MANNING & BAYNES.
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LONDON, E.C.

ANTIQUITY OF MAN.

On the 1st October, 1883, I was favoured with a letter from my friend Colonel Du Plat Taylor, informing me that "in the course of the extensive excavations at the Dock-works at Tilbury, north bank of the Thames, portions of a Human Skeleton had been found at 34 feet below the surface in a bed of sand; above this was a bed of clay, then a bed of peat 5 feet thick, and between this peat and the surface was another bed of clay."

The Colonel was so good as to put me in communication with Mr. Donald Baynes, the Engineer superintending the excavation at the time of the discovery, and that gentleman, bringing the remains in question for my examination, favoured me with the annexed diagram [facing this page], in more detail, of the strata down to and including the one in which the skeleton was found. In a "Note" which accompanied the "diagram" Mr. Baynes states:—"The sand ('Section,' no. 9), at the part in which the human remains were found, is 34 feet below the present surface."

In the work of excavation some disturbance of the skeleton had taken place before the Superintendent's

attention was called to it; but, through Mr. Baynes's care, the following parts were recovered and transmitted to me:—

Frontal bone, with adherent portions of the parietals and the base of the nasals.

Parts of the parietals confluent together, but showing a trace of the sagittal suture.

Portion of the occipital bone.

Left mandibular ramus, with coalesced symphysial portion of the right ramus, lower jaw.

Portions of ribs.

Portions of pelvis.

Shaft of right humerus.

Shaft of left radius.

Portion of left ulna.

Shaft of right femur, with detached head of the same bone.

Shaft of left femur, with portion of condyle.

Shaft of right tibia.

Shaft of left tibia.

Left astragalus.

Portion of calcaneum.

A few phalanges of hand and foot.

Three teeth from the fore part of the lower jaw.

Of these remains the instructive and characteristic parts of the cranium form the subjects of Plates I., II., and III.

The forehead is low and narrow; the mid-line of the frontal bone extends from the beginning of the sagittal suture in a regular uninterrupted curve to the upper interval of the frontal sinuses, from above which interval, after a short slight concavity, the line is continued between

the sinuses, again strongly convex, to the root of the nasals, which have coalesced with each other and become anchylosed to the frontal bone.

The frontal sinuses are prominent, each in length 1 inch, in breadth near their lower mesial ends half an inch, with an interval of 8 millim.; the prominences curve upward and outward; their surface is roughened by small irregular depressions; their broad, smooth, convex, mesial ends enter into the formation of the superorbital border, which is here not produced. The ordinary ridge-like upper border begins, and more abruptly on the left side, 14 millim. from the fronto-maxillary suture, the ridge expanding to a broader convex outer termination of the superorbital border. In the right orbit the ridge, beginning at the same distance from the suture, also broadens to the upper and outer angle of that border; but there is seen an irregular indent, as if from some blow received during life. Between the two portions of the ridge is a shallow superorbital notch, double on the left side; there is no foramen. The transverse diameter of the orbit is $1\frac{1}{2}$ inch. One inch extent of the orbital roof is preserved on the left side, about half that extent on the right.

The least external breadth of the frontal bone behind the orbits is $3\frac{1}{2}$ inches. The length of the frontal from the end of the sagittal suture to the nasals, following the curve, is 5 inches. There are no partial prominences of the frontal answering to those specified anthropotomically as "eminences" in modern European skulls. The greatest breadth of the frontals at the outer ends of the coronal suture is $4\frac{1}{4}$ inches. A well-marked "temporal ridge"

extends from the external angular process, arching backward, to the parietal.

On the inner surface of the frontal the "sulcus longitudinalis" is feebly and irregularly indicated where the inner table begins to project before being continued into a strongly developed "frontal crest," which terminates at its forward subsidence in a small "foramen cæcum."

The eminences and depressions indicative of cerebral convolutions are few and feebly indicated. Ramifications of the middle meningeal arteries are well impressed on the fore part of the inner table of the parietal. The portion of the occipital bone includes much of the right half of the lambdoidal suture with a strip of the so-connected parietal.

The "crista occipitalis," with both the superior and inferior curved lines or ridges, and the intervening spaces for the "complexi" and "rectus capitis postici" muscles, are strongly marked (Plate III. fig. 3), as is the bifurcation of the "inferior curved line," denoting the space for the "obliquus superior capitis" and the "rectus capitis posticus major" muscles. On the inner surface of the occipital bone the fossæ for the hind lobe of the cerebrum and that for the cerebellum are well marked; but there is no depression answering to that noted as the "*torcular Herophili*" in modern European skulls.

The contraction and slope of the forehead and the prominence of the frontal sinuses are matched by low Australian and Andamanese skulls; but I have not found in these so definite a channel between the prominences. The depression between the frontal and nasal bones is nearly the same; but the nasals are narrower in the Australian skulls compared.

With the parts of the cranium was rescued the lower jaw, represented by the left ramus * and the portion of the right ramus coalescing at the symphysis (Plates II. & III. fig. 2). This bone indicates, by the loss of masticating teeth, that the individual to whom it belonged had attained old age. Not only were the molars wanting, but their sockets had been absorbed and the tract of jaw which they had occupied was reduced to the diminished vertical diameter characteristic of the close of active life. More or less of the sockets of the two premolars, the canine, and the two incisors of the left ramus remained, indicative of such teeth not having been shed.

It exemplifies the pains taken to discover whatever parts of the skeleton had been dispersed in the excavation of their bed, that three teeth were found fitting the sockets at the fore part of the mandible (ib. *i*, *c*, *p*).

One of these teeth was an incisor, the second a canine, the third a premolar. Each tooth showed the extra work in mastication to which it had been put after the loss, during life, of the true grinders.

Of the incisor, *i*, one third of the crown had been ground down flat and polished: in Plate III., *i*, is shown a circular cavity at the base of the enamel on one side of the tooth, which I attribute to commencing decay. The fang, or root of the tooth, contracts to an obtuse end, which is closed.

The canine, *c*, shows a greater proportion of the crown worn down to a polished, slightly concave, flattened surface (*c*, Plate II.); the fang is similarly terminated and closed

* All the figures were drawn on the stones without reversing.

by the ossified remnant of pulp and capsule. On one side of the crown (Plate III., *c*) a cavity has invaded the base of the enamel, in size and shape resembling that in the incisor. The crown of the premolar, *p*, has been still more worn; little of it is left above the fang; the worn surface is flat and polished, very feebly concave, becoming convex at the back border. The fang is solidified, as in the other two teeth.

In size these teeth, or what is left of them, equal the corresponding parts of the same teeth in the Australian ('Odontography,' plate cxix. fig. 2), and exceed that of the European figured in the same plate (fig. 3).

The condyle and tip of the coronoid process are broken off the portion of lower jaw (Plates II. & III. fig. 2). The angle of the jaw is rounded off, as usually seen in the edentulous jaw of aged individuals. The ridge on the inner surface beneath the place of the molar-sockets (Plate III. fig. 2) is well marked. The symphysis, *s*, does not project beyond the incisor-sockets. The prominences at the back part of the symphysis, for the attachment of the "genio-hyoglossus," the "genio-hyoideus," and the "digastricus" muscles, are distinct and well marked. The first form a pair, subcompressed, vertically extended, with an interval scooped out, as it were, between them. The subjacent pair of genio-hyoidean processes, of equal vertical extent, are narrower and closer together. From the more obtuse digastric rising extends a broad and shallow fossa; the rising itself supports a pair of ridges, smaller and more apart than those above. Behind the alveolar tract the rising portion of the mandible, to which some anthropotomists restrict the term "ramus," as contradistinguished

from the horizontal portion or "body" of the bone, shows also, by the degree of obliquity of its axis to that of the "body," the senile character of the bone. On its inner surface (Plate III. fig. 2) the notch in the margin of the aperture of the mandibular canal, *m*, leads, as usual, to a groove, *n*, extending obliquely downward and forward; but the groove is here bridged over by a tract of bone, 8 millim. in extent, beneath a second aperture of a canal, *n*, from which the mylo-hyoidean nerve and vessel emerged, impressing a second groove, or continuation of that which is lost in the submandibular fossa. The wide smooth depression for the sublingual gland is feebly marked. The mylo-hyoidean ridge extending forward therefrom is strongly developed beneath the absorbed remnants of the last two molar alveoli. The "mental foramen" (Plate II. fig. 2), for the exit of the nerve and artery so-called, is of the usual size and in the usual position below the second premolar. Below the incisors the origin of the "levator menti" muscle is neatly defined by a low and narrow ridge. From the above details it may be inferred that the individual, though aged, was robust, and worked the jaw strongly in mastication.

In the cranial part of the skeleton the indications of strong muscular characters (Plate III. fig. 3) contrast with the low cerebral ones (*ib.* fig. 1), and like indications of brute force are given by the rest of the skeleton.

In the best-preserved humerus the ridge from the teres-tuberosity subsides upon the middle third of the shaft; a ridge separating the outer (radial) from the hinder (anconal) surface begins to rise about the lower third of the shaft, and is continued with augmenting extent and sharpness to

the entepicondyle ("internal condyle" of Anthropotomy); the oblique depression noted as the "musculo-spiral groove" is here smooth, broad, and shallow. The ulnar ("internal") side or surface of the shaft begins to be marked by a narrow ridge where the medullary artery enters its canal; this ridge gradually expands into a smooth convex border as it approaches the entepicondyle. The olecranal and coronoid depressions are separated by a strong plate of bone; the former is wide and deep, a small plate of bone rises from its bottom.

In the metacarpal bone, second of the left hand, the ridges for the anconal interosseous muscles are strongly marked; in the phalanx, first of the second finger, the ridges bounding the palmar surface are similarly developed.

Femora.—The shaft of the left thigh-bone (Plate IV. fig. 1) * shows a strongly developed "lesser trochanter," *a*, below which is a rough oblique prominence, *b*, for insertion of the "*iliacus internus*" muscle. A more remarkable character is shown by the part receiving the insertion of the "*gluteus maximus*" muscle. The proximal (upper) portion of the gluteal ridge (fig. 1, *c*) merits by its size and prominence the name of "third trochanter" †, answering almost in proportion to the process so-called in most perissodactyle quadrupeds. From this prominence the usual ridge is continued down answering to that termed "external lip of the linea aspera" in Anthropotomy, but stronger; here it forms the inner boundary of a rough

* The figures were drawn on stone without reversing.

† A similar process has been noticed in a human femur from a Belgian bone-cave. See Dello, 'Extrait du Bulletin du Musée Royal d'Histoire Naturelle de Belgique,' tome ii. 1883.

channel extending to where the "external" unites with the "internal lip," which is continued down from the well-defined, low, elongate process, *b*, forming the beginning of such so-called "internal lip" of the "linea aspera." This rough ridge is here by no means a low linear rising, but a thick outstanding one, *d*, which bifurcates at the lower fifth part of the shaft, *d'*: the outer division extends, narrower or sharper, to the back and outer border of the ectocondyle; the inner branch, going to the entocondyle, is less produced, but sufficiently so to define a flattened surface of the intervening triangular "popliteal space." The inner (tibial) surface of the proximal half of the shaft is divided into two facets by a low obtuse longitudinal prominence of the femoral wall. The shaft of the thigh-bone (fig. 2) is relatively thicker and stronger than is that of the average of modern male femora (figs. 3 & 4). The length of the preserved portion of the left femur is 1 foot 9 lines; the total length of the bone, with the extremities restored, as indicated in Plate IV., would be 1 foot 4½ inches. The circumference of the middle of the shaft is 3 inches 9 lines. The depression on the outer side of the outer condyle, here preserved,—usually described as the "popliteal groove," as affording origin to the "popliteus,"—is longer and broader than in recent femora, and indicates a thicker tendon and a more powerful muscle. Of the "head of the femur" belonging to the right limb, I have only to remark that the depression for attachment of the "round ligament" is longer or more elliptic in shape and deeper than usual.

The muscles known as "gluteus maximus" in man are those that mainly move or work the trunk upon the

legs, and, reciprocally, the legs upon the trunk. The unusual addition of insertional leverage to these muscles in the skeleton under description bespeaks a power and frequency of locomotion, and especially of actions of trunk and of upper limbs, requiring an adequate support and fulcrum in the lower limbs.

The pelvis is but fragmentarily represented: its very size and weight, far from favouring its preservation, hastened its destruction. The pick of the excavator smashed it; and the pieces were scattered by the shoveller among the superincumbent deposits in course of removal. The rescued portions are strictly human, indicate male proportions, and support an inference of the strength of the individual derived from better preserved bones.

I find nothing worthy of note in the portions of the foot-bones above specified.

All the bones and fragments of this Human skeleton were of a dark colour, derived apparently from the darker-coloured powdery sand in which they were brought to light. I applied to them the usual preliminary test in such finds of possible fossils, viz. the application of the tongue. In every instance it adhered, as when in long course of time the gelatine of the recent bone had oozed away, leaving the absorbent calcareo-phosphatic earth in excess. I thereupon called in the aid of my colleague, the experienced and accomplished Chemist of the Department of Mineralogy—aid which he had readily and ably afforded in relation to bones of lower Mammalian (extinct) kinds *. Corresponding bones of a recent human skeleton accom-

* See my 'Researches on the Fossil Remains of the Extinct Mammals of Australia (*Diprotodon australis*),' p. 242, vol. i., 4to, 1877.

panied the exhumed remains. The following is Dr. Flight's "Report":—

"The bone is considerably altered in appearance and character; it is of a fine dark brown colour, and is readily reduced to a powder in an iron mortar. When heated, water and only oily matter are evolved, and it turns black or nearly so; treated with soda-lime, a large quantity of ammonia is given off. The density of the bone is 2·138, that of the recent tibia was found to be 1·985. Treated for twenty-two hours in the cold with the requisite amount of hydrochloric acid, of specific gravity 1·04, it was found that:—

There was dissolved	86·98
Insoluble organic matter, "Schewere's Kestrin osseine"	11·63
Insoluble mineral matter, silica, &c. . .	1·39
	100·00

"The part dissolved consists of lime-phosphate &c. The insoluble portion, removed by heating, 11·63 per cent., comes next that found by Frémy in fossil ox-bones from the Oreston Caves. He found in the external part of a metatarsal 11·0 per cent. Frémy also found in rhinoceros-ribs from Fansan, Gers, of silica and fluoride 1·4 per cent. I send you some of the powdered bone; and

"I remain, &c.,

WALTER FLIGHT, D.Sc., F.R.S."

"The Laboratory,
British Museum, Natural History,
Cromwell Road, S. Kensington, S.W.
6th November, 1883."

Among the earlier acquisitions of Human remains from other than cave-localities, the lower jaw from the gravel-beds of Moulin-Quignon, investigated at Paris by joint French and English naturalists, may here be mentioned. It is sometimes referred to as a "fossil;" but the chemical composition, showing the proportion of original gelatine which it had lost and the kind and amount of extraneous mineral matter added to or replacing the phosphate of lime, has not, that I can find, been anywhere recorded.

The corpse of the individual whose osteological characters have been above noted found its grave about 3 feet below the surface of sand on which he trod—such surface having since subsided to a depth of 30 feet below the marsh-level forming the present banks of the Thames at that locality, and has there received successive deposits of the vertical extent severally noted in the "Section of Strata," facing p. 3. Portions of decayed blackened wood were found in the uppermost part of the sandy stratum, 9; and this stratum has been excavated to a depth of 10 feet since the discovery of the skeleton, and been found to rest upon the gravel known as "ballast" ("Section," no. 10).

The oldest known tool fashioned by human hands—the unpolished adze of flint—is, so far as I can learn, the sole evidence of a British palæolithic riverside man which has yet been recorded, at least on the Thames' banks, including the Tilbury locality whence the subject of the present tract was exhumed.

Bones which have similarly parted with a proportion of their original gelatine, and have received mineral additions to the bone-earth they retained, gaining for them the term "fossil," have been found on the North Bank associated

with the oldest forms of stone tools ; but such bones have hitherto been of the extinct kinds of Carnivores, Ruminants, Proboscidians, and Pachyderms, which also roamed over the land subsequently insulated as "Britain," and which were the chief source of food to the savages who made and wielded those palæolithic implements.

But the evidence of the great share taken by the teeth of my present subject in comminuting his food and fitting it for deglutition begets speculation as to the kinds of nutriment necessitating this exercise of the natural preparatory instruments of digestion. The best of these, the true molars, with their multiplied roots, massive crowns, and ridged square triturating surfaces, have been worn out, ground down to the stumps, and finally, with their sockets, removed by absorption. The smooth unbroken surface of the molar tract tells plainly that the aged palæolithic individual went on labouring for his subsistence long after the loss of his grinders, and putting such few teeth as remained to their utmost powers of trituration.

The tools he manufactured enabled him most probably to slay, under favourable circumstances, the big beast known as "Mammoth," which came to the margin of the river to quench its thirst. He may have obtained his share of the *Elephas primigenius* taken in an artificial pitfall, such as the lowest tribe of negroes with whom Livingstone tarried awhile on the banks of the Zambesi river prepared to entrap the African Elephant, which they then attacked and slew with weapons not greatly, if at all, superior to the palæolithic ones in reference to such lethal work *.

* I retain, as the most treasured of the few natural curiosities of a private collection, the spiral tusk of one of these Elephants, which was

Smaller Mammals, such as rhinoceros, horse, bison, megaceros-deer, primigenial ox, lion, bear, hyæna, wolf—remains of all which I have received from formations on the banks of the Thames, corresponding with, or analogous to, those at Tilbury—were objects of exciting chase or trap-capture, doubtless attended with frequent combat.

The palæontological coincides with the geological evidences in the conclusion that mankind existed on what is now Great Britain at a period antecedent to its severance by a "German Ocean" and an "English Channel" from the great Europæo-Asiatic continent.

The rudely cooked flesh of such would be gnawed down cleanly to the bone by the hungry hunters. Vegetable food would be obtained from wild uncultivated plants. Some fruits, such as the crab-apple, the sloe, the hips and haws, would be the dainties during short and special seasons: those could not be long stored, uncooked. The hazel-nuts, beech-mast, and acorns might be collected in quantities and kept for a longer period, combining a vegetable with the animal diet of our primitive predecessors. And here I cannot refrain from speculating on the stiffness of advancing years affecting the energies, the keen vision, the rapid strong stroke, which brought more abundantly animal food to the youthful wielder of his palæolithic weapon. The preparation for swallowing raw and hard fruits polished off the crowns of the few remaining teeth of the ancient, probably primitive, dweller of the Thames valley.

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presented to the Traveller by the Chief of the Tribe, whose hospitality Livingstone enjoyed during a brief period of rest in the course of his journey in 1850–55 across the African continent.

The existenee of Mankind in what now is insular Britain, at a period whieh Geology teaehes to have been prior to its severanee from the great Europæo-Asiatie eontinent by the "English" and "German" channels or seas, when our present Thames bore a larger stream of water probably to join some greater eontinental river, has been evideneed by the discovery of stone implements and weapons of the rude manufacture whieh has suggested the term "palæolithic" for sueh tools and the men who fashioned them.

The most abundant evidenee in support of the foregoing proposition has been given by an esteemed eolleague, Worthington G. Smith, Esq., F.L.S., in the 'Transactions of the Essex Field-Club'*.

This evidenee has been mainly derived from formations on the west bank of the Lea valley, north side of the Thames; but besides the "Lea" tributary, the author adds the loealities of Barking, East Ham, Ilford, Grays-Thurroek, Tilbury, Mucking, Orsett, and Southend. At all these plaees Mr. Smith has "found the stone tools *in situ*"†; and he gives valuable and instruetive evidenee of the respeetive formations in "Cuts of the Seetions" where they oeeur, espeeially in the Lea valley (figs. 2–8). But no bodily evidenee of the fabricators of the Palæolithie tools rewarded this persevering series of researehes.

"Human bones and teeth I have never been able to light on. The reasons why human bones are not found amongst the fossils of mammoth, horse, bison, and reindeer are many. Human bones are very liable to deeay;

* "Primæval Man in the Valley of the Lea," 8vo, 1883, p. 102.

† *Loc. cit.* p. 111.

few bones so small as human bones are ever found. Primæval men may have buried their dead, but if the bodies were left unburied hyænas and other animals would eat every scrap. Still the human pelvic bones are large and heavy enough for preservation; and no doubt the time will some day arrive when human bones will be found, and we shall be able to build up human skeletons of Palæolithic age" (p. 114).

The endeavour to fulfil the tool-deseriber's prevision has been a chief pleasure and eneouragement of foregoing osteologieal deseriptions and eomparisons. "The day will come," Mr. Smith repeats, "when we shall know mueh more of Palæolithic men than we now know. At present we only know that sueh men once existed, and made weapons and tools of stone during long periods of time." "Up to the present time there has not been a fragment of man's bony fabrie that ean with positive certainty be referred to a man of the River-Drift" (p. 142). "It must be understood that I do not refer to men of the Caves, but to the far older tribes who lived on the river-margins and others who lived before the present rivers flowed."

To requests from non-geological friends for grounds of inference as to the period of time indieated by the sueeessive strata overlying the human skeleton above deseribed, I have replied by remarks—superfluous to experts—much in the following terms:—

In the diagram exhibited at the Meeting of the Royal Soeiety, December 6, 1883, the stratum marked "*Sand*" (Table of Strata, no. 9, facing p. 3), in which the remains were found, differs from what we understand as "sea-shore sand"; it is of a dark eolour and of more powdery eon-

sistence. But, whatever its physical composition, we may regard the stratum as being that on which the man moved who therein left his bones. As *man* he must have breathed an aerial atmosphere—in other words, have trod the then surface of the earth. To receive the overlying bed the supporting one subsided; the level of the ground there to that extent has consequently changed. Both strata are now very far down.

Here we may pause to consider for how long a period the surface of the banks of the Thames has remained at its present level. During what lapse of time, it may be asked, has the river continued to flow, in course and size and relation to shores, as now it does?

Our evidence on this head does not go back beyond 2000 years, if so far. The Roman invasion of Britain before our Era (B.C. 53) extended to the Thames. The river was crossed by Julius Cæsar in his Second Invasion, B.C. 52, against obstacles set in the North Bank* by the ancient Britons 1938 years ago. But every inference from the available records of Cæsar's and subsequent Roman invasions indicates the Thames and its banks to have been much the same then as now, geologically speaking. No new stratum, at least at "Coway-Stakes," Oatlands, has been deposited on that which was trod by the then Natives and their Invaders.

But this is far from being the case with my present subject, the more ancient British Aboriginal. His ground

* At the locality still known as "Coway-Stakes," according to Camden and other reliable authorities. Here Cæsar "passed the Thames in face of the enemy." See Hume's 'History of England,' p. 2.

has subsided—has given way to a new and different soil, which continued to receive accessions of different and definable characters (see "Section") until a vertical thickness of 30 feet was superimposed. The geological operations on which depended the formation of the new deposits and the subsidence of the old ones give, however, no indication of a violent or sudden dealing with the then earth's surface at the locality in question.

The constructors and indwellers of the localities "Ambersbury" and "Loughton Camps,"* the defensive earthworks of which have recently been exposed in Epping Forest, were armed with flint weapons of Palæolithic character†. Our most experienced Antiquaries are "at one" in the conclusion that these rudely fortified structures were "pre-Roman"; but the period of the antecedent existence of such ancient Britons, who have left evidences in their entrenchments of cooking-fires as well as tools, remains conjectural. It can hardly give them better claim to a Palæolithic date than may be attached to the Tilbury skeleton.

Should the scrutiny of experienced Students of Surface-modifications be rewarded by an indication or proof of any change in the geological characters of the north bank of the Thames since Julius Cæsar's or Vespasian's time, it must be insignificant compared with that period during which occurred a subsidence of the soil, rendering that bank uninhabitable by the man of the black-sand epoch.

* 'Transactions of the Essex Field-Club,' vol. iii. 1884, p. 212.

† *Ib.* p. 226, fig. 3, "Celt found in Loughton Camp." Fig. 1, p. 224, and fig. 2, p. 225, "Conjoined Flakes, found in Loughton Camp."

His progeny or kind may have survived such change, have migrated landward; there is no ground for inferring the ancient race to have been swept away by a "flood." The tranquil or non-cataclysmal movements and operations resulting in a new surface or stratum went on, but with an accessory evidence of the progress of time.

Our earth received, as of yore, its solar, lunar, and atmospheric influences; but its surface at the locality in question continued slowly to subside—so gradually, indeed, as to admit, at successive periods, of the growth of trees and of generations of those low organized plants the débris of which constitute "peat."

It would seem at least that, for a time, the surface of the sandy soil (Table of Strata, no. 9) admitted of the growth thereon of trees, as testified by portions of their ligneous trunks and branches, now blackened and decayed (*ib.* 9′). Their destruction was inevitable when the surface sank and became overflowed, receiving then deposits of mud (*ib.* 8). But there were intervals of time, in which a *Sphagnum* or *Hypericum** could root itself in such parts of the mud-deposit as might be exposed to sun and air; for in this stratum peat occurs associated with the argillaceous matter; and this combination has a vertical extent of nearly four feet. The general movement of subsidence being resumed, no. 8 is overflowed by waters which leave upon it nearly two feet of pure mud, no. 7. Then a retreat of the overflowing waters with exposure of the surface allows of successive growths and decadence of the plants constituting peat, of which the stratum no. 6, nearly four

* *Hypericum elodes.*

feet thick, exclusively consists. I need hardly remark that the species of *Sphagnum*, a genus which contributes most to bog-formations, are mosses that grow in air; they send their roots most abundantly in swampy, clayey soils. Here the plant testifies, as does the man three strata below, to the nature of the atmosphere in which they lived and breathed.

After 3·58 feet vertical thickness had been thus attained the ground again subsided, again became overflowed, and again received deposits of mud to nearly four feet of vertical thickness (no. 5). Then, again, the water recedes or the land rises, and exposes to the atmosphere a surface overgrown by air-breathing plants. But the thickness of the stratum, 4, testifies to a briefer period of dry or boggy land at this locality; for, before two feet of pure peat had been formed, a stratum of mixed mud and peat, nearly two feet thick (no. 3), is overlaid. This then subsides to receive ten vertical feet thickness of unmixed mud (no. 2). In the course of subsidence changes in the land-surfaces wasted by the then fluvial current lead to a final deposit of six feet thickness of clay (no. 1), which now supports the marshy level at which the Dock-excavations commenced. They have extended, since the discovery of the skeleton, to the bottom of the black-sand deposits, which rest upon the gravel-bed known as "ballast," in which flint implements are more commonly found.

Let any equal mind, receptive of evidence to be judged on its own, exclusive, merits, without prepossessing bias, attempt to conceive the difference between the recorded lapse of time since the actual surface was first trod by a Roman soldier and the lapse of unrecorded time since the

sandy soil, eight strata and thirty feet lower down, was trod by the man whose osteological characters are given above.

It may be that since the sand, no. 9, lies upon the "ballast," no. 10, it indicates a geological date more recent than that of the gravel-beds at St. Acheul and Moulin-Quignon, which revealed to Boucher de Perthes in 1863 the tools of a Palæolithic French race, of which the osteal characters are yet unknown. Those gravels are alluded to by the experienced anthropologist De Quatrefages as "alluvial"; and by Prestwich as nearer our time than the Pliocene tertiaries.

In the careful summary of all the evidences bearing on the subject of the 'Work,'* for a copy of which I am indebted to the distinguished author, he remarks, on the Fuhlrott discovery of a human skull-cap in the grotto of Neanderthal, that "Les conditions dans lesquelles il a été trouvé ne paraissent pas permettre d'en préciser l'âge géologique avec certitude" (p. 30).

Of any anatomical claim to antiquity, or inferiority, which this portion of skull supports, I concur with the experienced craniologist Barnard Davis in the conclusions he has recorded in his 'Essay' on this special subject†. Amongst the skulls of modern educated gentlemen showing the alleged low and, so-called, "simial form" of cranium ‡, is that of the prelate Mansuy, "Evêque de

* 'Hommes fossiles et Hommes sauvages,' 8vo, 1884, par A. de Quatrefages.

† 'The Neanderthal Skull, its peculiar Conformation explained Anatomically.' By Joseph Barnard Davis, M.D. 8vo, London, 1864.

‡ Huxley, 'Man's Place in Nature.'

Toul," given by Prof. de Quatrefages in the previously cited work, fig. 36, p. 62.

The skull which Dr. Davis figures, p. 10, *op. cit.*, was a recent specimen obtained from the phrenological collection of M. Deville. "There is no reason for thinking that it is any more than a calvarium of a modern Englishman" (*ib.* p. 4). M. de Quatrefages concurs with Dr. Davis and repeats the figure in the same page of the work in which the Bishop's skull is represented.

These are exceptions to the cranial outline in the educated humanity of the actual or recent period, whilst the "Tilbury skull" may accord with the rule in the Palæolithic range of time. But the bimanal characters of the skeleton are distinct from quadrumanal ones in the earliest, as in the latest and highest, races of mankind.

The sections of the strata on the west bank of the Thames-tributary from the Lea valley, and on the north banks of the Thames itself, down to and beyond Tilbury, from which strata flint implements of the ruder kinds have been derived, lead me to conclude that the man whose bones have been discovered in the ninth well-defined stratum beneath the actual surface of the present Thames bank may have availed himself of like tools for combat, defence, and slaughter of the animals affording the chief supply of his sustenance, and may have belonged to one of the older tribes who lived on the river-margins and left the evidences of their abodes on the north, now Essex, side above cited.

The only evidence of a resort to flint for a tool or weapon, discovered in the course of the Dock-excavations, is a nodule showing fractures at portions broken off by some violence,

now in the Engineer's Office, East and West India Dock-Extension, Tilbury.

There is no question that the present river bore, in Cæsar's time, the name it now retains. The "Thamesis" of the 'Commentaries' is the Latin form of "Thames." Tacitus writes "Tamesa." In A.D. 40, Vespasian, in conflict with the Britons under Caractacus, drew back toward the mouth of the Thames. If the river were fordable at Coway-Stakes, it does not seem probable that its subsequent course and banks differed materially from their present conditions. The body of water increased as it approached the sea; the tidal Thames at Tilbury is now half a mile in breadth. The latest evidence of subsidence, in some contiguity with the river's mouth, seems to be the legend of such loss of the lands of the Saxon Earl Godwin. If such cultivated surface did sink so recently it has received a deposit of sea-sand, which is left dry at low-water.

London probably originated in the convenience of its contiguity to the tidal Thames for transit by water of men and merchandise. In the time of Diocletian, A.D. 290, we read that "After the defeat of Alectus his followers, taking flight to London and purposing to pillage that City and escape by sea, are met by another part of the Roman army." Whence it may be inferred that a commercial city on the Thames bank, on which now stands the "Tower," had, in course of time, grown to be a wealthy place. It seems reasonable to associate its foundation, like the fordable state of the Thames at Oatlands, with a condition of the river and its banks hardly, if at all, different from the present. Again, in the reign of Constantius, we read that Lupicinus, with a force of light-armed soldiers,

disembarking at Rutupiæ (south coast of Britain, opposite to the present Boulogne), "marched to London to consult there about the war." Thus we get evidence of the City's metropolitan character at that date. Shortly after, Theodosius, in the reign of the Emperor Julian, "enters London victoriously." At which period, A.D. 368, it was proposed to change the name of the City to that of "Augusta."

It is true that remains of Roman magnificence are occasionally brought to light some ten feet or more beneath the present level of a city which has been successively sacked and more or less ruined by Saxon and Danish invaders, and has been a prey to subsequent conflagrations. The actual level of London streets is due to superposition of such accumulated ruins and débris, with repeated pavings, not to subsidence of the bank of the Thames which received the Roman and, probably, British beginnings of our metropolis. The Roman remains are found above the present level of the Thames at high water*.

What is testified of the geological relations of the river and its banks in two localities pretty far apart (Coway-Stakes and the Tower) near two thousand years ago may not improbably apply to one of its banks about twenty-five miles below London Bridge.

* The following are amongst the localities:—Leadenhall Street, Lime Street, Lombard Street, Ludgate Hill (base of), Queen Victoria Street, Strand Lane, and Walbrook. The banks of the "Wall Brook," a tributary to the Thames, seem to have been a favourite locality for Roman villas. The Tower of London stands on the ground which supported the Roman citadel. Antiquarian evidences of the above sites of earliest civilized Londoners are preserved in the Museum and Library of the Guildhall.

Prior to the "marsh-level" (Section of Strata, facing p. 3) there occurred geological changes—successive sinkings and risings of the earth's surface—in the locality in question, at intervals admitting of growths and decays of trees and bog-plants, from which an inference may be reasonably drawn of a period of past time which, from evidences above submitted, may be regarded as "Palæolithic."

Evidence of the "Antiquity of Man," deduced from the discovery of his bones in caves, was submitted to the Royal Society on the 9th June, 1864, and published in the 'Philosophical Transactions' for the year 1869. In the cave at Bruniquel, on the bank of the Aveyron, parts of a human skeleton, including the skull, were exposed in a stalagmitic breccia, 4 feet below the horizontal floor of stalagmite, of which breccia a mass, of the density of building-stone, including the skull, was detached, under my supervision, in 1863, and is now in the Palæontological Gallery of the British Museum of Natural History, Cromwell Road. In a recess of the, of old, inhabited cave, at a depth of 5 feet 2 inches from the upper surface of the stalagmite, and in a block of stalagmitic breccia of stony hardness, a second human skull, mutilated in the labour of detachment of the matrix, was discovered with other parts of a human skeleton*. At every foot of depth of the breccia of the cavern were found scattered implements of flint and bone—the latter chiefly supplied by antlers of reindeer (*Cervus tarandus*). Evidences of fires blackened the breccia more or less to the depth of 6 feet. The mammals which had been cooked for food, every bone of

* Phil. Trans. *ut suprà*, pp. 520–531.

which, containing marrow, had such medullary cavities exposed, included those of reindeer, bouquetin, chamois, primigenial ox, wild horse, besides birds and river-fish, those of the reindeer being by far the most abundant. The great proportion of the latter indicated a climate more nearly arctic or glacial than now prevails in that latitude, and suggest geographical changes, such as have induced a "gulf-stream" for example, operating to bring about the climatal conditions of the present "south of France."

In my 'Letter' to the 'Principal Librarian of the British Museum,' of date January 24, 1864*, I stated, among the facts in favour of the purchase of the "Bruniquel Collection," that "Two implements exhibit an outline of an animal's head finely cut;" and I added that "they are the earliest known works of graphic art representing a species now extinct in temperate Europe"†.

The care and pains subsequently applied to researches in ossiferous caves on the Continent and in England have satisfied the geologist of the prehistoric antiquity of our species; but I have been the recipient of doubts lingering in the minds of accomplished non-geological visitors as to the unquestionable value or trustworthiness of cave-evidence.

"Show us," they have said, "the remains of man's body fossilized in any degree, that have been discovered in stratified deposits, at a depth, and beneath successive formations, the interpretation of which supports a reference to the Palæolithic era of post-Pliocene time."

* *Ib.* p. 532.

† See 'Woodcuts,' figs. 7–9, pp. 553–555, of Equines; fig. 6, p. 532, of Reindeer and Bouquetin (Philos. Trans., 1869).

Any such demonstration would be received with complacent indifference by the school of "Conjectural Biology." It records a "*Homo alalus*" (Dumb-man) of Miocene age, and a "*Homo pithecanthropus*" (Ape-man), existing as far back as the Eocene period*. There is no labourer at the true and firm foundations of zoology who would more honestly welcome unquestionable evidences of such transitional forms revealed by those Tertiary formations than myself.

The testimony of the Abbé Bourgeois was but coolly received by those who might have been expected most warmly to welcome it, when he pronounced a formation in which flint tools had been found as of Miocene age. Such evidence was superfluous to the Transmutationist †.

The deposits at Saint-Prest were, however, referred by more competent geologists to an early post-Tertiary period —"au quaternaire inférieure."

The nodules of flint stated to be found in the "Middle Miocene" at "Thénay, dans la Beauce (Loir-et-Cher)," and submitted to the Anthropological Congress at Paris by the Abbé‡, were not received by experts as satisfactory proofs of man's work.

Incised markings on cetaceous bones (*Balænotus*), from a formation in Italy held to be of Pliocene age, are inter-

* Häckel, 'Natürliche Schöpfungsgeschichte,' 8vo, 1868.

† Boujou, "Transformiste convaincu, je n'ai pas attendu la découverte des silex miocènes pour admettre l'existence de l'homme tertiaire." Bulletins de la Société d'Anthropologie de Paris, t. viii. p. 675.

‡ Bourgeois, "Etude sur les silex travaillés trouvés dans les dépôts tertiaires de la Commune de Thénay." Congrès Internationale d'Anthropologie, &c., 1868, p. 67.

preted by Professor Capellini as evidence of contemporary human operations with a cutting-tool.

The Baron de Baye has summed up the recorded evidences, from tools and other handiworks, of the existence of mankind, satisfactorily so determined, in his work entitled 'L'Archéologie préhistorique' (1880), in which he concludes by expressing serious doubts as to the alleged evidence of Tertiary men of either Miocene or Pliocene age.

The value and character of this work may be judged by the fact that the experienced anthropologist, Professor de Quatrefages, who had previously visited the Château de Baye and studied the rich series there preserved of archæological evidences, the results of which are given in his work before cited (pp. 79, 96, 101), issued in 1884, therein states that he wrote to M. de Baye asking for his convictions, after the alleged evidences of Tertiary man adduced since the year 1880, and in reference to the suggested stages of transformation from the quadrumanal to the bimanal types during Tertiary epochs. The following was the reply :— "Tout en respectant l'opinion des Archéologues qui vont plus loin que moi, je ne trouve pas encore les faits acquis d'une affirmation motivée, et j'attend, prêt à reconnaître et de suivre les progrès de la Science."

The prehistoric existence of Mankind, generically and specifically identical with those now living, has been confirmed by his remains found in caves and by his tools of flint and bone found there and elsewhere.

The want which the able collector and describer of Palæolithic weapons in Pleistocene deposits now forming the north bank of the Thames has so earnestly expressed

(*ante*, p. 18) I believe to have been fulfilled by the discovery briefly recorded in the 'Proceedings of the Royal Society,' vol. xxxvi. p. 136 (December 6, 1883), and more fully in the exposition of the characters of the skeleton and of the geological conditions of its grave set forth and illustrated in the present work.

EXPLANATION OF THE PLATES.

Plate I.

Fig. 1. Calvarium or skull-cap, outer view.
2. Fore border of the same, showing frontal sinuses and portions of the orbital and nasal cavities.

Plate II.

Fig. 1. Left side view of calvarium.
2. Left ramus of lower jaw; with outside view and grinding surface of the incisor, *i*, canine, *c*, and premolar, *p*.

Plate III.

Fig. 1. Right side view of calvarium.
2. Left ramus of lower jaw; with inside views of the incisor, *i*, canine, *c*, and premolar, *p*.
3. Portion of occiput, outer view.

Plate IV.

Fig. 1. Femur, back view, with ends restored in outline.
2. Portion of shaft, side view.
3. Femur of recent male individual, back view.
4. Portion of shaft, side view.

(All the figures are drawn, of the natural size, on the stones without reversing.)

Printed by Taylor and Francis, Red Lion Court, Fleet Street.

Fig. 1

Pl. 1.

Fig. 2.

From nat, on Stone, by J Erxleben.

Hanhart imp

Fig. 1.

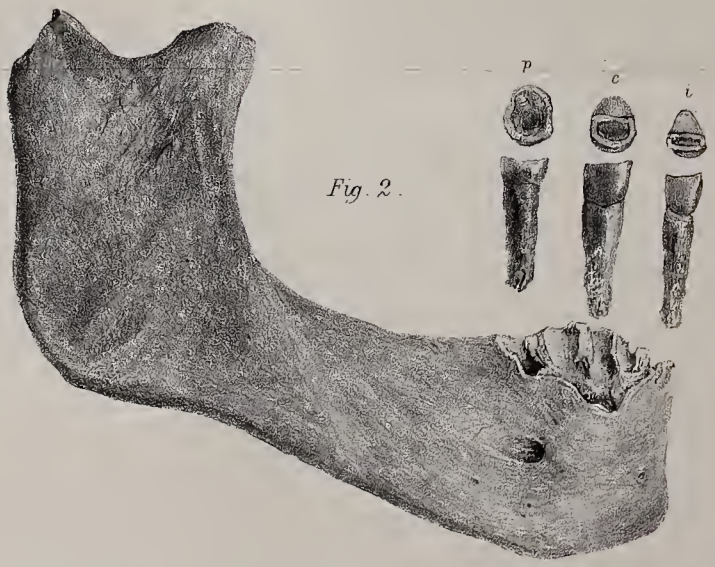

Fig. 2.

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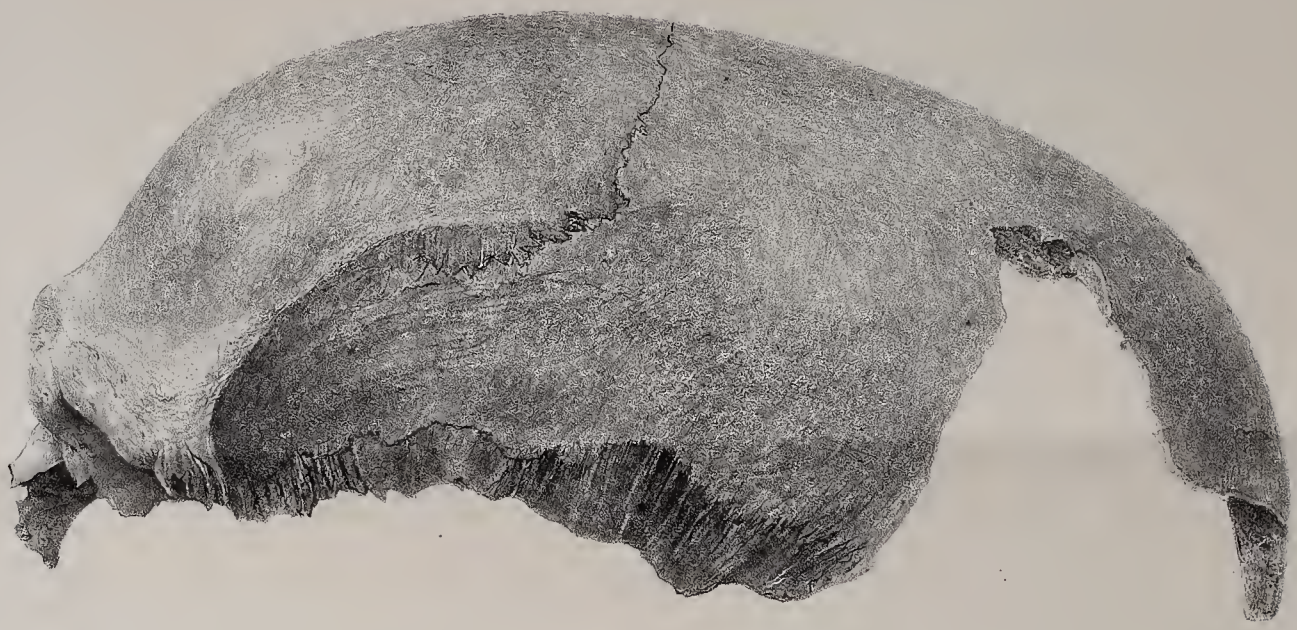

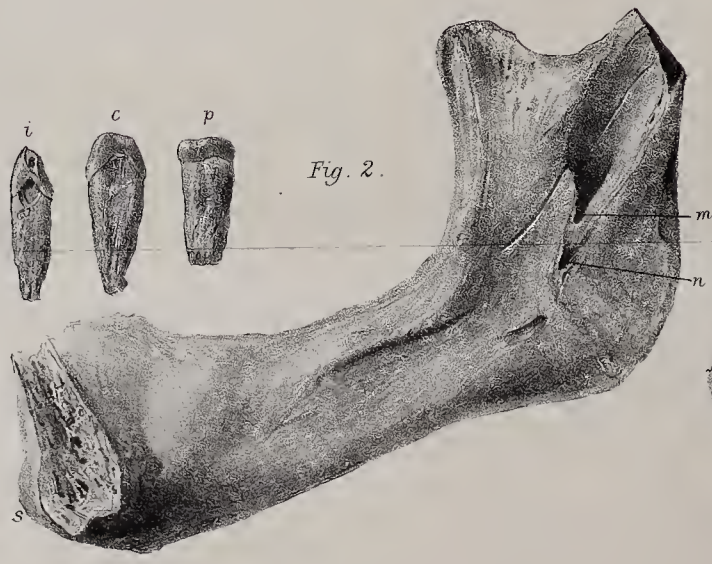

Fig. 2.

Fig. 3.

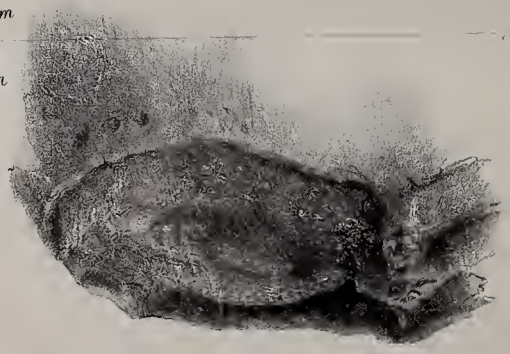

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Fig. 3

Fig. 1

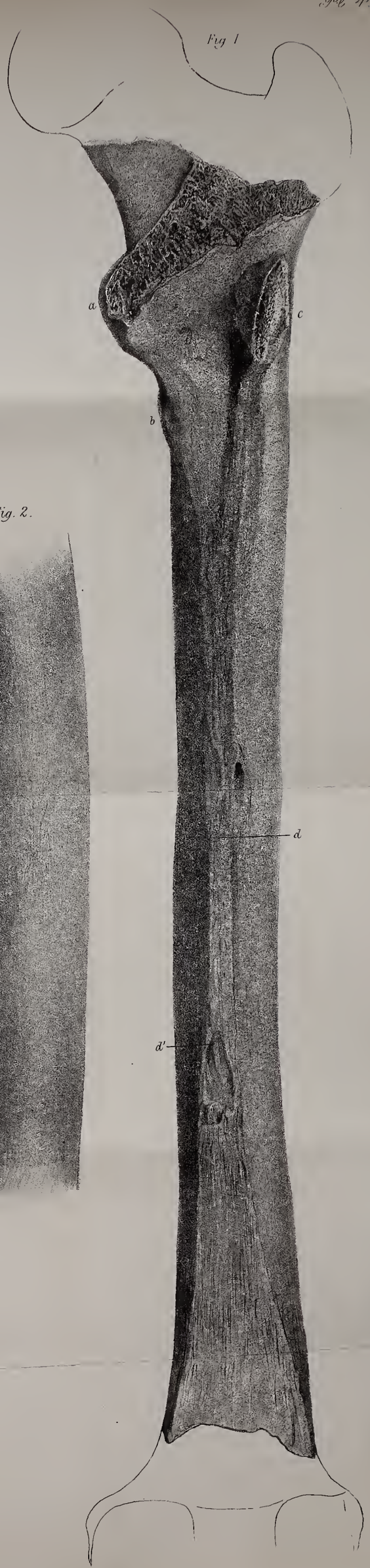
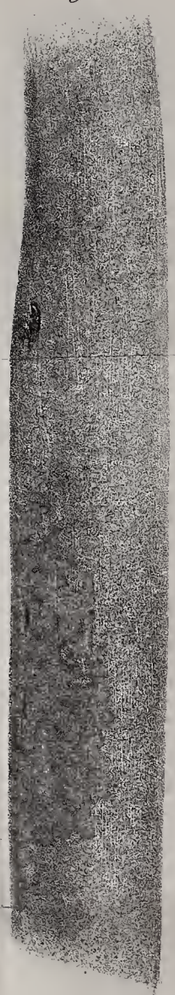


Fig. 4



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